The Non Traditional In Situ Vitrification Demonstration and Deployment (TA- 21) Material Disposal Area V At Los Alamos National Laboratory

Technology Background

The non-traditional in situ vitrification (NTSIV) demonstration at Los Alamos National Laboratory is sponsored by the Department of Energy's Environmental Office of Science and Technology (DOE-EM-OST) Subsurface Contamination Focus Area. A partnership has been established between MSE-Technology Applications of Butte, Montana, Geosafe Corporation of Richland, WA, and Los Alamos National Laboratory as the host site, to demonstrate a non-traditional approach to in-situ vitrification.

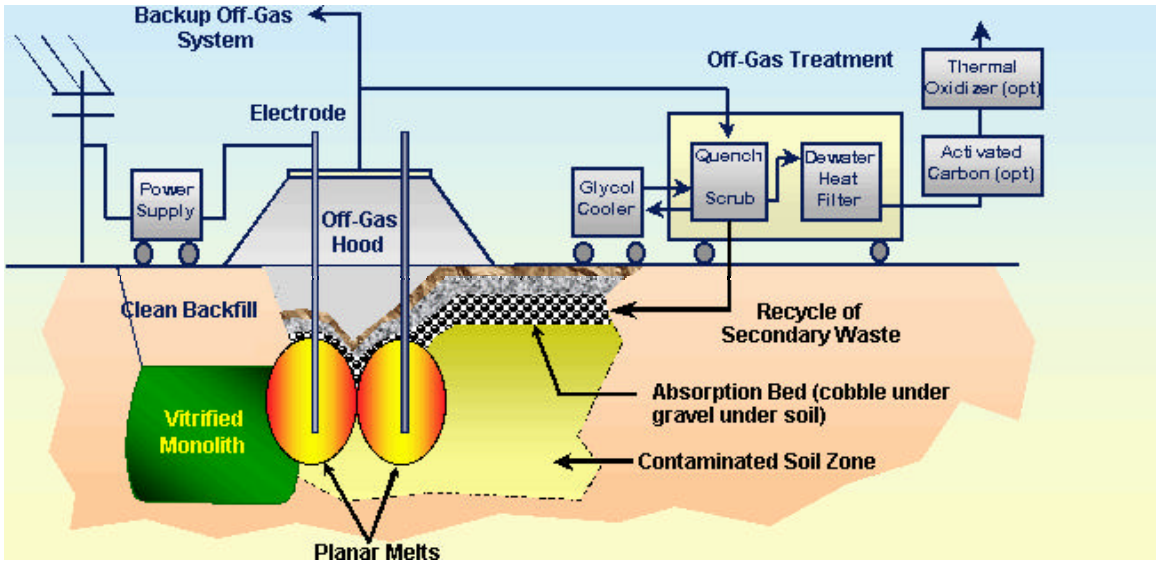
Geosafe Corporation developed a different approach to traditional in situ vitrification, called planar geomelting, which is to be demonstrated at Technical Area 21, Material Disposal Area V in the Spring of 1999.

The conventional method of top-down melting typically produces a melt as wide or wider than its depth. Planar melting, however, a method of creating tall and thin planar melts in the subsurface, creates formation of melts much narrower than the melt depth. This has several advantages over traditional melts:

- It can be used for narrow treatment zones (i.e. trenches)
- Greater depths can be reached
- Melting can be focused sideways for buried waste and underground tanks.

This technology also promises to be suitable for forming rock-like subsurface barrier walls.

Planar melting in a "bottom-up" configuration allows safe and quick treatment of wastes that generate high gas volumes upon treatment. Top down melting is limited with such wastes because of the need to avoid excessive gas movement through the melt. In planar melting, such gases may be expected to move to the surface rather than the melt. The "bottom-up" planar melting approach presents an attractive, permanent solution for some of the buried waste sites because:



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- Organic contaminants are destroyed;
- Metals and radionuclides are permanently immobilized
- Processing capabilities: in situ, ex situ and staged below grade;
- Product is non-hazardous, delistable residual, (similar to obsidian) with superior chemical durability;
- Waste volume reduction at LANL is expected to be 50% or more;
- It can be applied to mixtures of contaminants including organic, inorganic,
- metals and radioactive waste;
- It offers maximum public and occupational safety, and
- The economics are competitive.

Site Information

Technical Area 21 was the first post-Manhattan Project plutonium and uranium processing facility at Los Alamos. The facility produced weapons-grade metal for use in weapons production. Many of the chemical and physical processes to purify and produce the materials were developed at TA-21 and used later in the larger weapons complex. In addition, TA-21 was the site of many different research activities related to the space nuclear program, plutonium heat sources, and other weapons and non weapons programs.

The site selected for the demonstration/deployment of the NTISV is located at the extreme southwest of TA-21, across from the townsite. Material Disposal Area V consists of three absorption beds that were used to disperse effluent from a "nuclear" laundry facility located nearby, which operated from 1945-1961. The absorption beds consists of cobbles, gravel and sand. Site characterization activities were conducted in 1994 and 1996. Results from the sampling during these field activities indicate contamination with both radiological and RCRA constituents.

Because of the characterization results and relative uniformity of the absorption beds, MDA V was deemed a prime candidate for this technology demonstration/deployment.

The demonstration/deployment will occur in two phases: a "cold" demonstration in a mockup of the absorption bed, during the Spring of 1999; and a "hot" deployment on a 25x30 by 22ft depth area of the northwest absorption bed - at this time, scheduled for late Summer 1999.

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